



DEPARTMENT OF DEFENSE EXPLOSIVES SAFETY BOARD  
2461 EISENHOWER AVENUE  
ALEXANDRIA, VIRGINIA 22331-0600

28 NOV 1990

DDESB-KT

MEMORANDUM FOR AFISC/SEW, NORTON AFB, CA 92409-7001

SUBJECT: CBU 52 Buffers

1. References:

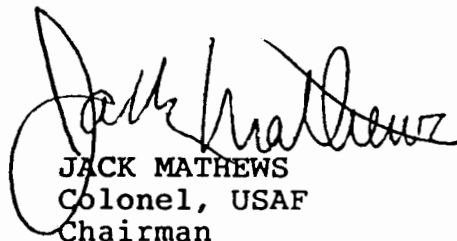
a. AFISC/SEW letter dated 20 April 1990, Subject: CBU 52 and CBU 71 Buffers.

b. DDESB-KT memorandum dated 10 May 1990, Subject: CBU 52 and CBU 71 Buffers.

c. AFISC/SEW letter dated 18 October 1990, same subject as above.

d. DDESB-KT memorandum dated 30 April 1990, Subject: Approval of Twelve USAF Buffered Storage Configuration Diagrams.

2. The proposal to use CBU 52 buffers as originally presented in reference 1.a and questioned in reference 1.b has been re-evaluated as requested in reference 1.c. Based on the loading data provided by reference 1.c, the use of CBU 52 buffers is approved for the same configurations originally approved for CBU 58 buffers by reference 1.d, and subsequently approved for CBU 71 buffers in reference 1.b.

  
JACK MATHEWS  
Colonel, USAF  
Chairman

DL

30 Apr 90



DEPARTMENT OF DEFENSE EXPLOSIVES SAFETY BOARD  
2461 EISENHOWER AVENUE  
ALEXANDRIA, VIRGINIA 22331-0600

DDESB-KT

MEMORANDUM FOR AFISC/SEW, NORTON AFB, CA 92409-7001

SUBJECT: Approval of Twelve USAF Buffered Storage  
Configuration diagrams

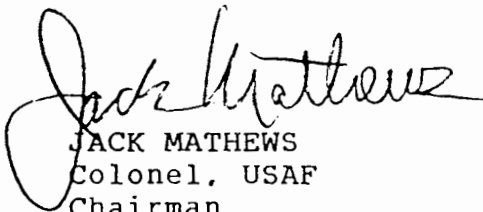
1. References:

a. AFISC/SEW letter dated 20 April 1990, subject:  
Informal Comments on Twelve USAF Buffered Storage Configuration  
Diagrams.

b. DDESB memorandum for record dated 12 March 1990,  
subject: Informal Comments on Twelve USAF Buffered Storage  
Configuration Diagrams.

2. The subject diagrams submitted by reference 1.a have been  
reviewed as requested. Suggestions and comments outlined in  
reference 1.b have been addressed. The twelve USAF buffered  
storage configuration diagrams (enclosed) are approved by this  
office.

12 Encls

  
JACK MATHEWS  
Colonel, USAF  
Chairman



DEPARTMENT OF THE AIR FORCE  
HEADQUARTERS AIR FORCE INSPECTION AND SAFETY CENTER  
NORTON AIR FORCE BASE, CA 92409-7001

REPLY TO  
ATTN OF: SEW

22 MAY 1990

SUBJECT: Buffered Storage

TO: See Distribution

1. The enclosed buffered storage drawings have been approved by the DDESB and may be implemented. Units may not deviate from the specifications in the drawings except for the following:

a. Although these configurations were designed for igloo storage, units may employ buffered storage systems in aboveground magazines or in outdoor storage. Outdoor storage must be approved by the MAJCOM.

b. Units may use fewer bombs in the bomb stacks.

c. CBU-71s in CNU-180 containers may be used in lieu of CBU-58s. The CBU-52 is not yet authorized.

d. Some variations are authorized in the notes contained in each drawing. For example, "Aisle dimensions shown herein may be adjusted to suit local conditions and/or available Material Handling Equipment (MHE)."

2. Any deviations other than those listed above must be approved by AFISC. Send a detailed drawing with the deviation if a drawing will help clarify the request. Examples of deviations that must be approved are:

a. Using less buffer material. Units may remove bombs from bomb stacks without requesting a deviation. There may be times when the removal of bombs results in buffer rows that don't "shadow" any bombs. If the removal of bombs will result in an opportunity to use less buffer material and still maintain adequate coverage for the remaining bombs, then the organization may request a deviation to remove some of the buffer material. Units must not remove buffer material until the deviation is approved.

b. Additional bombs in the bomb stacks. Some of the buffered storage configurations are restricted by limited space in the structure to move bomb pallets. If units employ a particular configuration in an aboveground magazine and have enough physical room to place more bomb pallets into the stacks, they must request a deviation prior to doing so. The maximum NEW in any buffer stack will not exceed 60,500 pounds.

c. Storage of other than inert or approved buffer materials in the structure must be approved as a deviation.

3. Buffered storage drawings will eventually be included in a technical order. Until then, MAJCOMs with units that use buffered storage will maintain copies of each drawing in file and distribute the drawings to subordinate organizations as needed. Units that employ buffered storage will maintain applicable copies at the unit.

4. Field units may have questions about buffered storage systems. We've attempted to answer some of them in the background paper at Atch 1.

5. The second phase of buffered storage includes testing with generic buffers (sand, dirt, and gravel in metal containers) and "customized" systems. If a unit has a special need for buffered storage, they can submit their proposal through the MAJCOM to AFISC. A special need can include facility size constraints or other configurations that aren't currently approved by the DDESB. These special requests must include drawings.

6. POC for buffered storage is SMS Mauldin, AUTOVON 876-3137.

*Paul D. Price*

PAUL D. PRICE, P. E., GM-15

Deputy Chief, Weapons & Space Safety Division  
Directorate of Aerospace Safety

2 Atch

1. Background Paper
2. Distribution List

## BACKGROUND PAPER

ON

### BUFFERED STORAGE DRAWINGS

1. PURPOSE: Buffered storage is a relatively new concept and represents a radical departure from the traditional method of quantity-distance calculations. This paper explains some of the provisions contained in the buffered storage drawings so that MAJCOMs can answer questions and evaluate proposals from field units.

2. GENERAL REQUIREMENTS: Buffered storage works only under very specific circumstances, therefore, the rules for the employment of buffered storage must be very specific and cannot be deviated from without authorization. Buffered storage is a system, and the rules for buffered storage can be compared to the parts of a mechanical system. Remove enough parts in the mechanical system, and the machine fails. Deviate from enough rules of the buffered storage system, and the system will fail. Some of these rules are absolutely inviolable; buffered storage will fail if fragments penetrate the bomb casing, the bombs aren't properly oriented, or too much blast pressure reaches a stack of bombs.

3. MAXIMUM CREDIBLE EVENT: The total NEW for a facility configured with buffered storage is a function of the Maximum Credible Event (MCE). The MCE is the maximum amount of explosives one can expect to detonate given a specific event. For buffered storage, the MCE is the NEW of the largest stack of bombs plus the NEW of buffer material in C/D 1.2. Class/Division 1.4 is not additive, and does not compute in the MCE calculations. For example, in drawing #900402E, there are two stacks of MK82s with a stack of CBUs between the bomb stacks. The largest stack of MK82s contains 306 bombs, or 58,752 pounds NEW. The buffer stack contains 60 CBU 58s, or 9480 pounds NEW. The MCE for this configuration is 68,232 pounds, and this is the NEW you should use for Quantity-Distance calculations. If you want to put another 120 CBU 58s in the building, they will physically fit, but the Q-D arc must be expanded to the 87,192 pound NEW arc incurred by the added CBUs, because these additional munitions can be expected to detonate in an explosion. You may also pack the extra space with 20MM TP or inert items. In this instance, the extra ammo does not affect the MCE, therefore, the Q-D arc does not change.

4. NOTES: The following paragraphs pertain to the notes in the buffered storage drawings:

a. Install metal plugs in fuze wells. Testing proved that unprotected bomb fuze wells are extremely susceptible to initiation by fragment penetration. The plastic caps in the nose and tail fuze wells don't provide enough protection, therefore, metal plugs are installed in the nose and tail fuze wells to protect them from fragment penetration.

b. Bomb rows nearest the buffer material must have nose end facing the buffer. During the test series, we found that if the bombs weren't faced nose-to-nose on the inside rows of the bomb stacks, the stacks propagated. We suspect that the rounded ogive of the bomb nose causes a channeling effect for both the fragments that reach the face of the stack as well as the pressure wave. The rows closest to the buffer stacks are the critical rows; the other rows of bombs may be pointed in either direction.

c. Bomb stacks must be separated by 38 feet. The drawings are designed for bombs stacks in the 60,000 pound NEW range. When the bomb stacks are too close to each other, the pressures generated by a 60,000 pound detonation cause the bomb casings in the acceptor stack to crush, resulting in detonation. When bomb stacks in the 60,000 pound NEW range are separated by at least 38 feet, the pressure dissipates sufficiently to prevent compression of bomb casings and the resultant detonations.

d. Verticle offset of buffer rows must be with metal dunnage. Minimum offset is on the order of 2 to 4 inches or whatever is necessary to prevent line-of-sight. Tests conducted with MK82s and 20MM indicated that if the bottom row of buffer is placed on wooden dunnage, a fire in the structure will result in the dunnage burning with enough heat to cook off the 20MM. The dunnage fails, the buffer stack falls, and the protection afforded by the buffer stack disappears. Eventually, low order detonations of the bombs begins. Therefore, wooden dunnage is prohibited in the bottom row of 20MM. Wooden dunnage is also prohibited for verticle offset, for the same reason. The purpose of the verticle offset is to eliminate line-of-sight through the buffer pallets. This verticle offset is also required with buffers in metal dunnage, such as 30MM and CBUs.

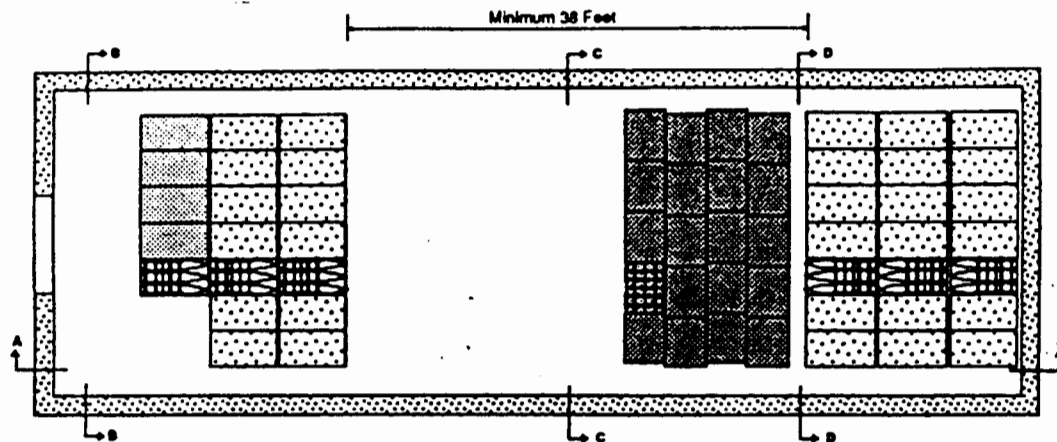
e. No line-of-sight permitted from bomb stack to bomb stack. Fragments must not be able to pass unimpeded through the buffer stack. This is eliminated by horizontal and verticle offset.

f. 20MM and 30MM ammo may be any type (TP, HEI, etc. . .).

g. Additional buffer materials shall not result in loading densities greater than 6.14 pounds per cubic foot. Loading density is the total MCE in the structure divided by the total volume in cubic feet. For example, in drawing #900402E, assume the structure contains 19,635 cubic feet of volume. If you add the total MCE in this configuration and divide it by the total volume (68,232 pounds/19,635 cu. ft.) you get 3.48 pounds per cubic foot. Each configuration has a maximum load density based on tests. If you add more buffer material in C/D 1.2, this must be added to the MCE and will result in a higher load density.

h. Caution must be exercised to assure the integrity of the buffer stack is not disturbed. If you begin to remove any of the buffer, you must first remove any portion of the bomb stack that will have a line-of-sight violation when the buffer is removed. Any time line-of-sight from bomb stack to bomb stack is compromised, the MCE reverts to the total quantity of explosives (except C/D 1.4) in the structure.

i. Buffer may be positioned anywhere in the space between bomb stacks. Although this provision is intended to provide flexibility to the unit, we strongly recommend the buffer be centered between the bomb stacks. This provides an optimum blast response for the buffer stack.



282 each MK 82

52 Pallets 20MM

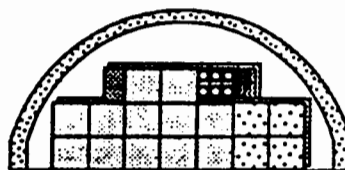
306 each MK 82



Section A-A

### Notes:

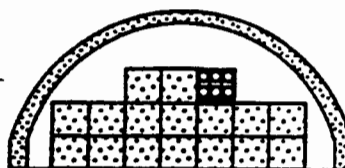
1. Install metal plugs in all MK82 bomb fuze wells.
2. Bomb rows nearest the buffer material must have nose end facing the buffer, bomb stacks must be separated by a minimum of 38 feet.
3. Buffer stack may be positioned anywhere within the space between bomb stacks.
4. Vertical offset of buffer rows must be with metal dunnage. Minimum offset is on the order of 2 to 4 inches or what ever is necessary to prevent line of sight.
5. The bottom row of 20MM ammunition used as buffer material must be on metal pallets.
6. No line-of-sight permitted from bomb stack to bomb stack through buffer.
7. The total NEW stored, for quantity distance purposes, will be computed upon the combined NEW of the largest stack of bombs and the total NEW of class 1 division 2 buffers. The NEW of class 1 division 4, 20MM, is not additive.
8. Buffer may be any configuration of 20MM in standard pack metal cans.
9. Empty space can be used for inert items or additional buffer material specified in this or other approved drawings. Additional buffer materials shall not result in loading densities greater than 3.8 pounds per cubic foot.
10. Caution must be exercised to assure that the integrity of the buffer stack is not disturbed. Removal of any portion of the buffer stack will defeat the integrity of the buffer. The quantity distance requirements will then be based upon the total NEW stored in the facility.
11. Maximum load density for this arrangement is 3.8 pounds per cubic foot.
12. Storage arrangement and aisle spacing shown are based on use of a commercial 6,000 lb. forklift.
13. Aisle dimensions shown herein may be adjusted to suit local conditions and/or available Materials Handling Equipment (MHE).
14. Minimum distance from the walls will be as specified in appropriate technical orders.
15. Serviceable munitions or munitions with only such defects that do not affect explosives safety may be used in the bomb stacks or buffers.



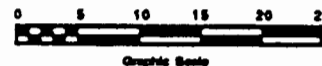
Section B-B



Section C-C



Section D-D



MK 82 (Tritonal Filled)  
With 20MM Buffer  
Arch Igloo

Reviewed By:

*Joseph J. Janney*  
Joseph J. Janney  
Director Inspection Operations  
MSOY/OI

Approved By:

*Paul D. Price*  
Paul D. Price  
HQ AFISC/SEWV

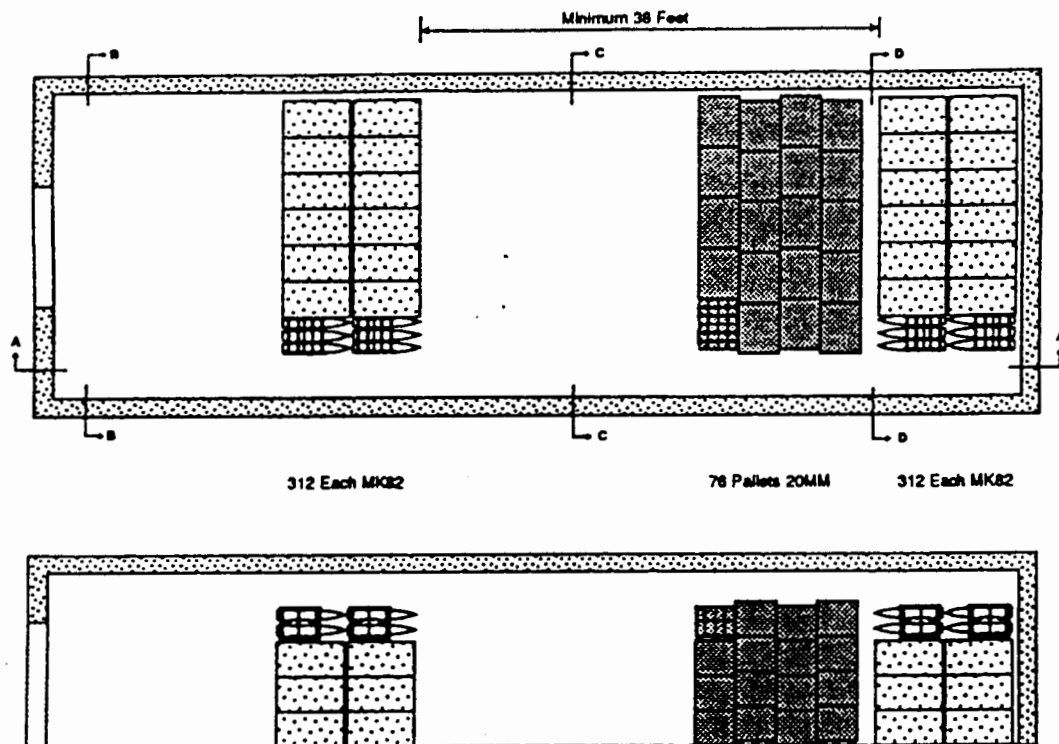
AFISC Draw No

AFISC 900402A

DEPT

*John H. Hetherington*  
John H. Hetherington  
CHAIRMAN

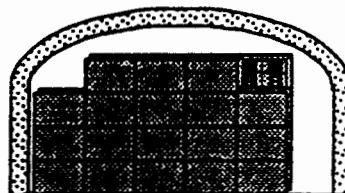




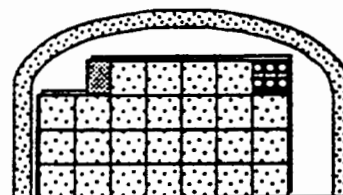
Section A-A

# Notes:

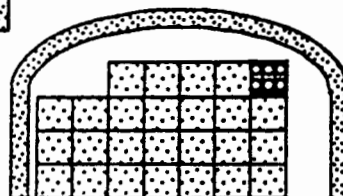
1. Install metal plugs in all MK82 bomb fuze wells.
2. Bombs rows nearest the buffer material must have nose end facing the buffer, bomb stacks must be separated by a minimum of 36 feet.
3. Buffer stack may be positioned anywhere within the space between bomb stacks.
4. Vertical offset of buffer rows must be with metal dunnage. Minimum offset is on the order of 2 to 4 inches or what ever is necessary to prevent line of sight.
5. The bottom row of 20MM ammunition used as buffer material must be on metal pallets.
6. No line-of-sight permitted from bomb stack to bomb stack through buffer.
7. The total NEW stored, for quantity distance purposes, will be computed upon the combined NEW of the largest stack of bombs and the total NEW of class 1 division 2 buffers. The NEW of class 1 division 4, 20MM, is not additive.
8. Buffer may be any configuration of 20MM in standard pack metal cans.
9. Empty space can be used for inert items or additional buffer material specified in this or other approved drawings. Additional buffer materials shall not result in loading densities greater than 3.8 pounds per cubic foot.
10. Caution must be exercised to assure that the integrity of the buffer stack is not disturbed. Removal of any portion of the buffer stack will defeat the integrity of the buffer. The quantity distance requirements will then be based upon the total NEW stored in the facility.
11. Maximum load density for this arrangement is 3.8 pounds per cubic foot.
12. Storage arrangement and aisle spacing shown are based on use of a commercial 6,000 lb. forklift.
13. Aisle dimensions shown herein may be adjusted to suit local conditions and/or available Materials Handling Equipment (MHE).
14. Minimum distance from the walls will be as specified in appropriate technical orders.
15. Serviceable munitions or munitions with only such defects that do not affect explosives safety may be used in the bomb stacks or buffers.



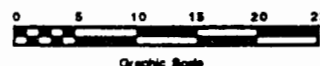
Section C-C



Section B-B



Section D-D



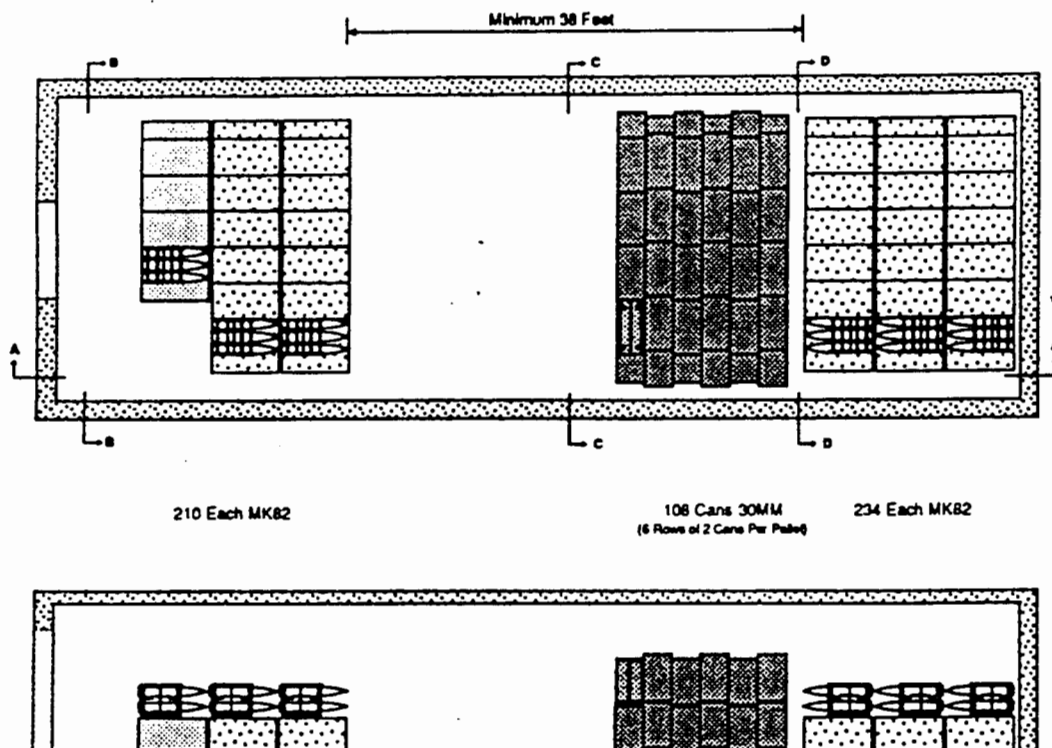
## MK 82 (Tritonal Filled) With 20MM Buffer Storage Layout

Reviewed By: *Joseph J. Seruola*  
Joseph J. Seruola  
Director Investigative Munitions  
MSDYOI

AFBC Diag No.  
AFISC 900402B

Approved By: *Paul D. Price*  
Paul D. Price  
HQ AFSC/SEW

DESS  
*Paul D. Price*



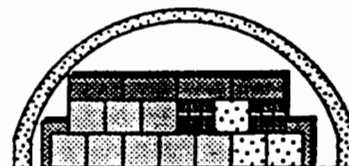
Section A-A

**Notes:**

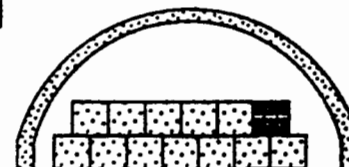
1. Install metal plugs in all MK82 bomb fuze wells.
2. Bombs rows nearest the buffer material must have nose end facing the buffer, bomb stacks must be separated by a minimum of 36 feet.
3. Buffer stack may be positioned anywhere within the space between bomb stacks.
4. Vertical offset of buffer rows must be with metal dunnage. Minimum offset is on the order of 2 to 4 inches or what ever is necessary to prevent line of sight.
5. No line-of-sight permitted from bomb stack to bomb stack through buffer.
6. The total NEW stored, for quantity distance purposes, will be computed upon the combined NEW of the largest stack of bombs and the total NEW of class 1 division 2 buffers. The NEW of class 1 division 4, 30MM, is not additive.
7. Buffer may be any configuration of 30MM in standard pack metal cans.
8. Empty space can be used for inert items or additional buffer material specified in this or other approved drawings. Additional buffer materials shall not result in loading densities greater than 3.8 pounds per cubic foot.
9. A minimum thickness of 1" dunnage must be used between the first and second level containers of 30MM ammunition when offset.
10. Caution must be exercised to assure that the integrity of the buffer stack is not disturbed. Removal of any portion of the buffer stack will defeat the integrity of the buffer. The quantity distance requirements will then be based upon the total NEW stored in the facility.
11. Maximum load density for this arrangement is 3.8 pounds per cubic foot.
12. Storage arrangement and aisle spacing shown are based on use of a commercial 8,000 lb. forklift.
13. Aisle dimensions shown herein may be adjusted to suit local conditions and/or available Materials Handling Equipment (MHE).
14. Minimum distance from the walls will be as specified in appropriate technical orders.
15. Serviceable munitions or munitions with only such defects that do not affect explosives safety may be used in the bomb stacks or buffers.



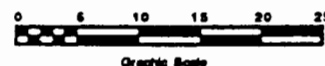
Section C-C



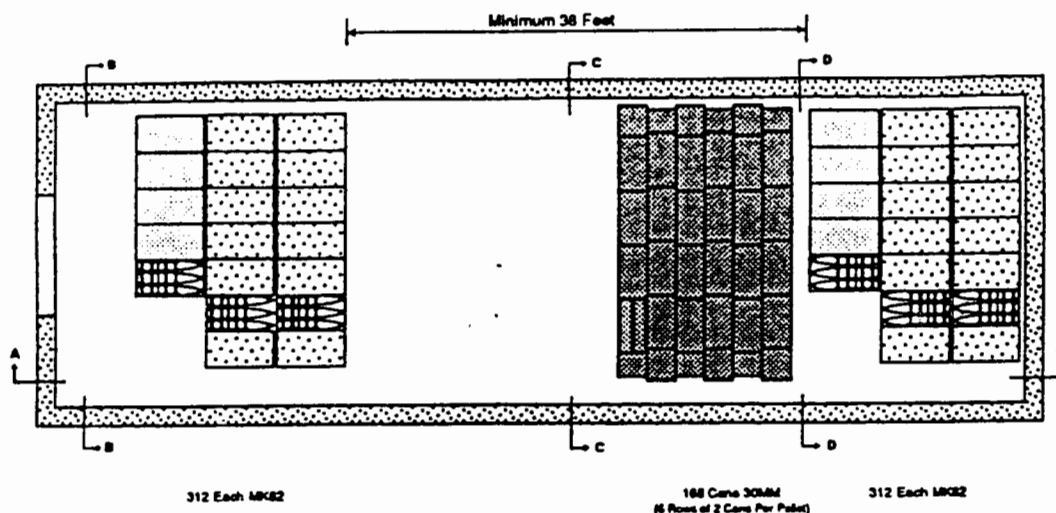
Section B-B



Section D-D



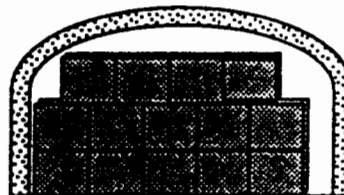
MK 82 (Tritonal Filled) With 30MM Buffer Arch 1960	
Reviewed By: <i>4-12-90</i> <i>Joseph J. Jones</i> Director Inertive Munitions MSDYOI	Approved By: <i>Paul D. Price</i> HQ AFISG/SEW
AFISG Dwg No. AFISG 900402C	<i>John H. Hester</i>



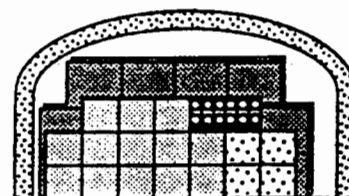
Section A-A

# **Notes:**

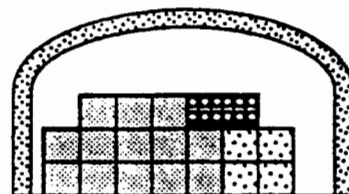
1. Install metal plugs in all MK82 bomb fuze wells.
2. Bombs rows nearest the buffer material must have nose end facing the buffer, bomb stacks must be separated by a minimum of 36 feet.
3. Buffer stack may be positioned anywhere within the space between bomb stacks.
4. Vertical offset of buffer rows must be with metal dunnage. Minimum offset is on the order of 2 to 4 inches or what ever is necessary to prevent line of sight.
5. No line-of-sight permitted from bomb stack to bomb stack through buffer.
6. The total NEW stored, for quantity distance purposes, will be computed upon the combined NEW of the largest stack of bombs and the total NEW of class 1 division 2 buffers. The NEW of class 1 division 4, 30MM, is not additive.
7. Buffer may be any configuration of 30MM in standard pack metal cans.
8. Empty space can be used for inert items or additional buffer material specified in this or other approved drawings. Additional buffer materials shall not result in loading densities greater than 3.8 pounds per cubic foot.
9. A minimum thickness of 1" dunnage must be used between the first and second level containers of 30MM ammunition when offset.
10. Caution must be exercised to assure that the integrity of the buffer stack is not disturbed. Removal of any portion of the buffer stack will defeat the integrity of the buffer. The quantity distance requirements will then be based upon the total NEW stored in the facility.
11. Maximum load density for this arrangement is 3.8 pounds per cubic foot.
12. Storage arrangement and aisle spacing shown are based on use of a commercial 6,000 lb. forklift.
13. Aisle dimensions shown herein may be adjusted to suit local conditions and/or available Materials Handling Equipment (MHE).
14. Minimum distance from the walls will be as specified in appropriate technical orders.
15. Serviceable munitions or munitions with only such defects that do not affect explosives safety may be used in the bomb stacks or buffers.



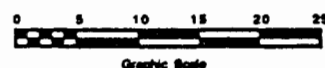
Section C-C



Section B-B



Section D-D



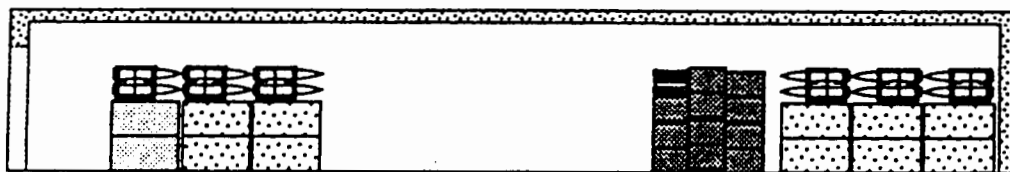
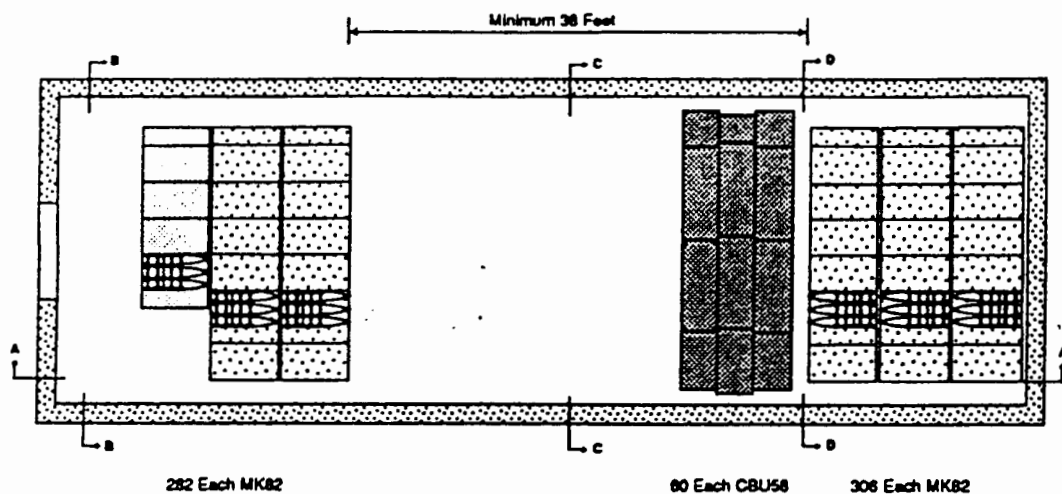
**MK 82 (Tritonal Filled)**  
With 30MM Buffer  
Stacking 1000

Reviewed By: *[Signature]* 4-12-86  
Joseph J. Jones  
Director Inertive Munitions  
MSD/YOI

Approved By: *[Signature]*  
HQ AFISC/BEVV

AFISC Draw No  
AFISC 900402D

*[Signature]*



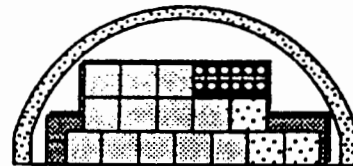
Section A-A

**Notes:**

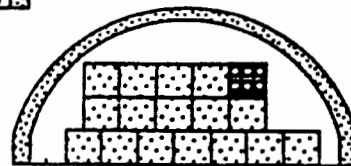
1. Install metal plugs in all MK82 bomb fuze wells.
2. Bombs rows nearest the buffer material must have nose end facing the buffer, bomb stacks must be separated by a minimum of 36 feet.
3. Buffer stack may be positioned anywhere within the space between bomb stacks.
4. Vertical offset of buffer rows must be with metal dunnage. Minimum offset is on the order of 2 to 4 inches or what ever is necessary to prevent line of sight.
5. No line-of-sight permitted from bomb stack to bomb stack through buffer.
6. The total NEW stored, for quantity distance purposes, will be computed upon the combined NEW of the largest stack of bombs and the total NEW of class 1 division 2 buffers.
7. Buffer may be any series metal container loaded with two each CBU56's.
8. Empty space can be used for inert items or additional buffer material specified in this or other approved drawings. Additional buffer materials shall not result in loading densities greater than 8.14 pounds per cubic foot.
9. A minimum thickness of 2" dunnage must be used between the second and third level containers of CBU's when offset.
10. Caution must be exercised to assure that the integrity of the buffer stack is not disturbed. Removal of any portion of the buffer stack will defeat the integrity of the buffer. The quantity distance requirements will then be based upon the total NEW stored in the facility.
11. Maximum load density for this arrangement is 6.14 pounds per cubic foot.
12. Storage arrangement and aisle spacing shown are based on use of a commercial 6,000 lb. forklift.
13. Aisle dimensions shown herein may be adjusted to suit local conditions and/or available Materials Handling Equipment (MHE).
14. Minimum distance from the walls will be as specified in appropriate technical orders.
15. Serviceable munitions or munitions with only such defects that do not affect explosive safety may be used in the bomb stacks or buffers.



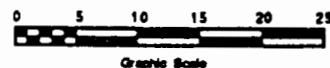
Section C-C



Section B-B



Section D-D



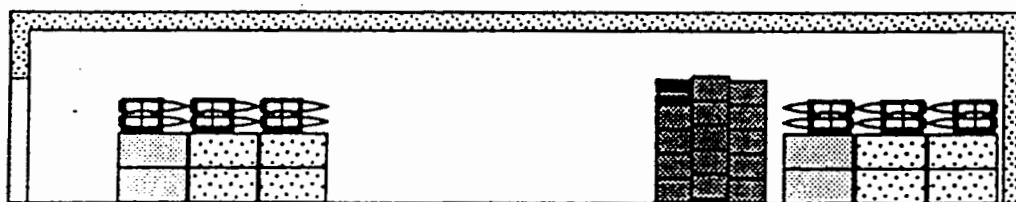
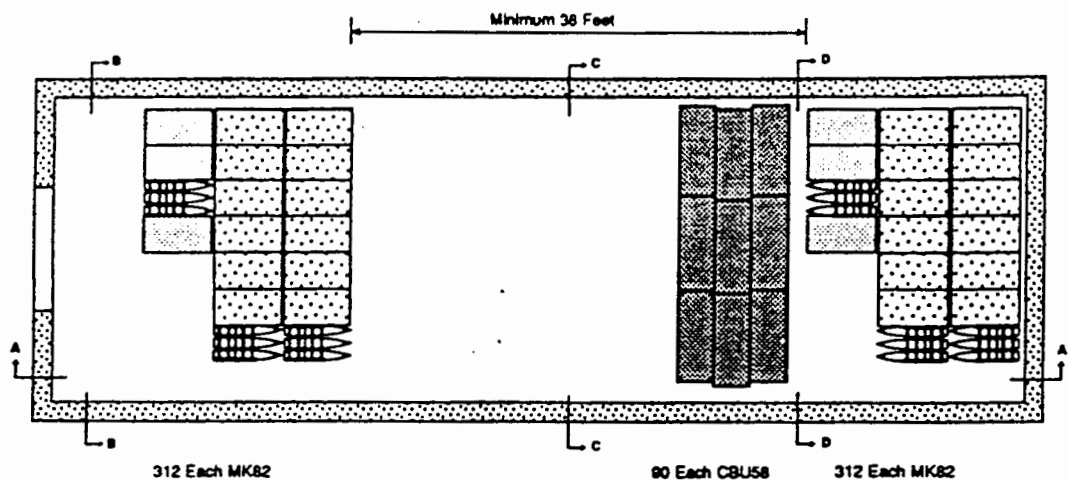
**MK 82 (Tritonal Filled)**  
With CBU 56 Buffer  
Arch 19100

Reviewed By: *Joseph J. K... 4-12-92*  
Joseph J. K...  
Director Inertive Munitions  
MSD/VOI

AFISC Dwg No  
AFISC 900402E

Approved: *Paul D. Price*  
Paul D. Price  
HQ AFISC/SEWV

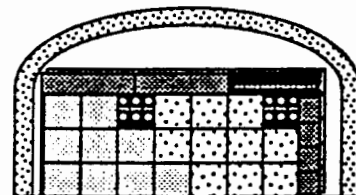
DOESB



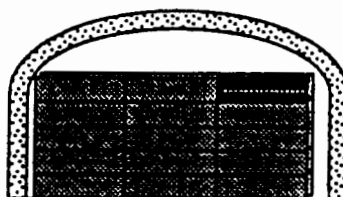
Section A-A

### Notes:

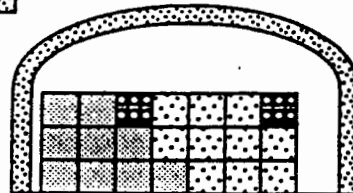
1. Install metal plugs in all MK82 bomb fuze wells.
2. Bombs rows nearest the buffer material must have nose end facing the buffer, bomb stacks must be separated by a minimum of 38 feet.
3. Buffer stack may be positioned anywhere within the space between bomb stacks.
4. Vertical offset of buffer rows must be with metal dunnage. Minimum offset is on the order of 2 to 4 inches or what ever is necessary to prevent line of sight.
5. No line-of-sight permitted from bomb stack to bomb stack through buffer.
6. The total NEW stored, for quantity distance purposes, will be computed upon the combined NEW of the largest stack of bombs and the total NEW of class 1 division 2 buffers.
7. Buffer may be any series metal container loaded with two each CBU58's.
8. Empty space can be used for inert items or additional buffer material specified in this or other approved drawings. Additional buffer materials shall not result in loading densities greater than 6.14 pounds per cubic foot.
9. Caution must be exercised to assure that the integrity of the buffer stack is not disturbed. Removal of any portion of the buffer stack will defeat the integrity of the buffer. The quantity distance requirements will then be based upon the total NEW stored in the facility.
10. Maximum load density for this arrangement is 6.14 pounds per cubic foot.
11. Storage arrangement and aisle spacing shown are based on use of a commercial 6,000 lb. forklift.
12. Aisle dimensions shown herein may be adjusted to suit local conditions and/or available Materials Handling Equipment (MHE).
14. Minimum distance from the walls will be as specified in appropriate technical orders.
15. Serviceable munitions or munitions with only such defects that do not affect explosives safety may be used in the bomb stacks or buffers.



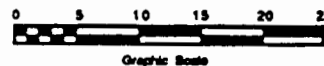
Section B-B



Section C-C



Section D-D



### MK 82 (Tritonal Filled) With CBU58 Buffer Storage Layout

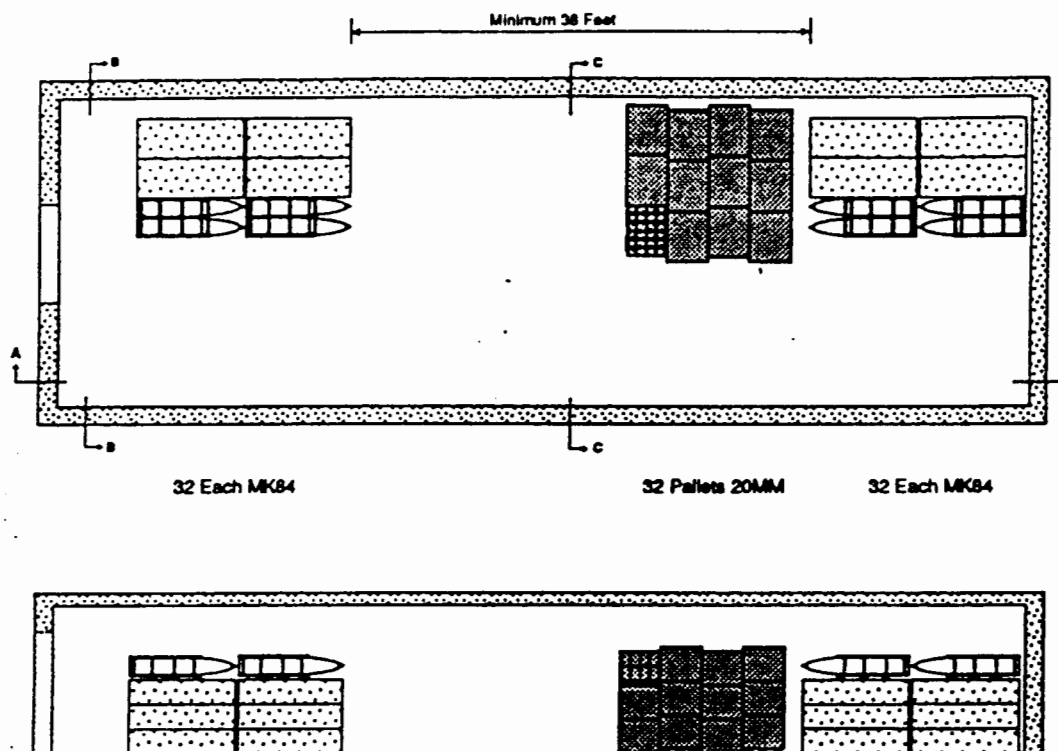
Reviewed By: *Joseph Janus*  
Joseph Janus  
Director Inertive Munitions  
MSO/IOI

AFSC Diag No:

AFISC 900402F

Approved By: *Burt A. Price*  
Burt A. Price  
HQ AFISC/SEWY

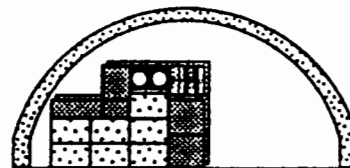
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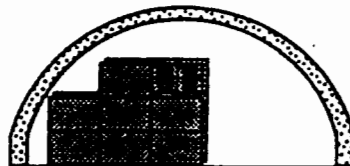
Section A-A

**Notes:**

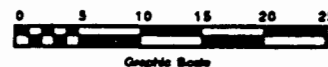
1. Install metal plugs in all MK84 bomb fuze wells.
2. Bombs rows nearest the buffer material must have nose end facing the buffer, bomb stacks must be separated by a minimum of 38 feet.
3. Buffer stack may be positioned anywhere within the space between bomb stacks.
4. Vertical offset of buffer rows must be with metal dunnage. Minimum offset is on the order of 2 to 4 inches or what ever is necessary to prevent line of sight.
5. The bottom row of 20MM ammunition used as buffer material must be on metal pallets.
6. No line-of-sight permitted from bomb stack to bomb stack through buffer.
7. The total NEW stored, for quantity distance purposes, will be computed upon the combined NEW of the largest stack of bombs and the total NEW of class 1 division 2 buffers. The NEW of class 1 division 4, 20MM, is not additive.
8. Buffer may be any configuration of 20MM in standard pack metal cans.
9. Empty space can be used for inert items or additional buffer material specified in this or other approved drawings. Additional buffer materials shall not result in loading densities greater than 3.8 pounds per cubic foot.
10. Caution must be exercised to assure that the integrity of the buffer stack is not disturbed. Removal of any portion of the buffer stack will defeat the integrity of the buffer. The quantity distance requirements will then be based upon the total NEW stored in the facility.
11. Maximum load density for this arrangement is 3.8 pounds per cubic foot.
12. Storage arrangement and aisle spacing shown are based on use of a commercial 8,000 lb. forklift.
13. Aisle dimensions shown herein may be adjusted to suit local conditions and/or available Materials Handling Equipment (MHE).
14. Minimum distance from the walls will be as specified in appropriate technical orders.
15. Serviceable munitions or munitions with only such defects that do not affect explosives safety may be used in the bomb stacks or buffers.



Section B-B



Section C-C



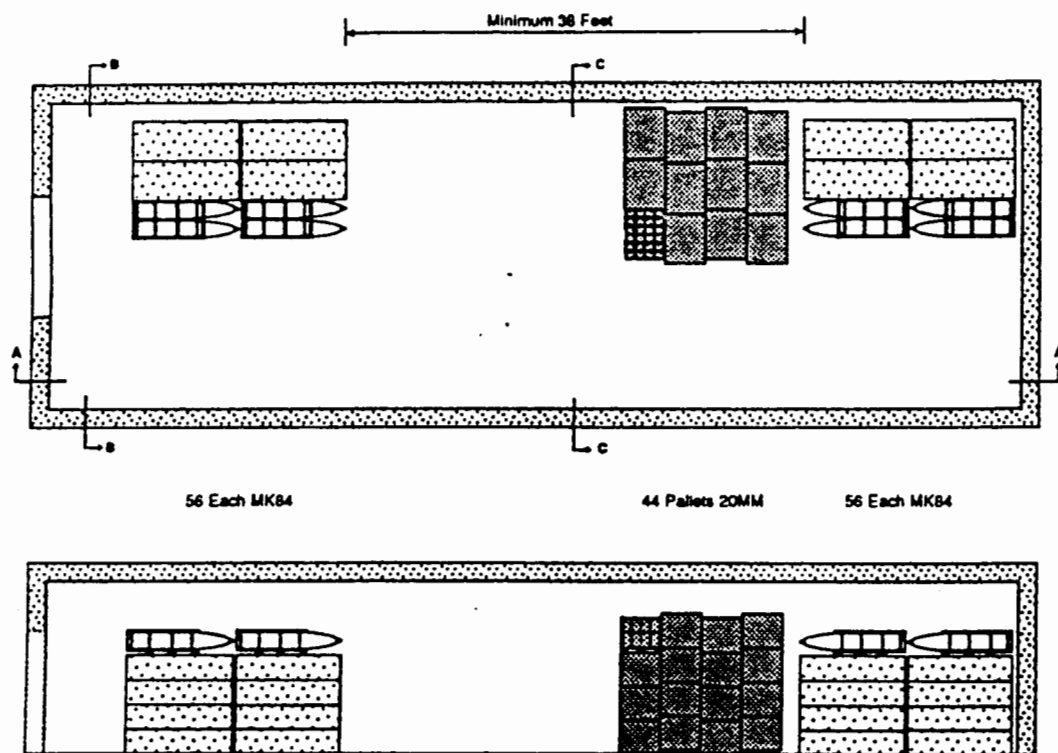
**MK 84 (Tritonal Filled)  
With 20MM Buffer  
Arch 1900**

Reviewed By: *4-72-80*  
*Joseph Janus, Jr.*  
Joseph Janus, Jr.  
Director Explosive Munitions  
MSD/YOI

AFISC Draw No.  
AFISC 900402G

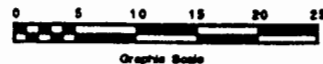
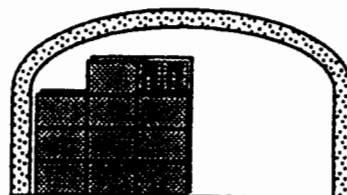
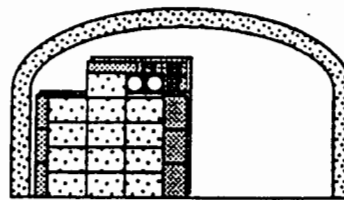
Approved By: *Paul A. Price*  
Paul A. Price  
HQ AFISC/BEWV

AFISC Draw No.  
*AFISC 900402G*



### Notes:

1. Install metal plugs in all MK84 bomb fuze wells.
2. Bombs rows nearest the buffer material must have nose end facing the buffer, bomb stacks must be separated by a minimum of 36 feet.
3. Buffer stack may be positioned anywhere within the space between bomb stacks.
4. Vertical offset of buffer rows must be with metal dunnage. Minimum offset is on the order of 2 to 4 inches or what ever is necessary to prevent line of sight.
5. The bottom row of 20MM ammunition used as buffer material must be on metal pallets.
6. No line-of-sight permitted from bomb stack to bomb stack through buffer.
7. The total NEW stored, for quantity distance purposes, will be computed upon the combined NEW of the largest stack of bombs and the total NEW of class 1 division 2 buffers. The NEW of class 1 division 4, 20MM, is not additive.
8. Buffer may be any configuration of 20MM in standard pack metal cans.
9. Empty space can be used for inert items or additional buffer material specified in this or other approved drawings. Additional buffer materials shall not result in loading densities greater than 3.8 pounds per cubic foot.
10. Caution must be exercised to assure that the integrity of the buffer stack is not disturbed. Removal of any portion of the buffer stack will defeat the integrity of the buffer. The quantity distance requirements will then be based upon the total NEW stored in the facility.
11. Maximum load density for this arrangement is 3.8 pounds per cubic foot.
12. Storage arrangement and aisle spacing shown are based on use of a commercial 6,000 lb. forklift.
13. Aisle dimensions shown herein may be adjusted to suit local conditions and/or available Materials Handling Equipment (MHE).
14. Minimum distance from the walls will be as specified in appropriate technical orders.
15. Serviceable munitions or munitions with only such defects that do not affect explosives safety may be used in the bomb stacks or buffers.



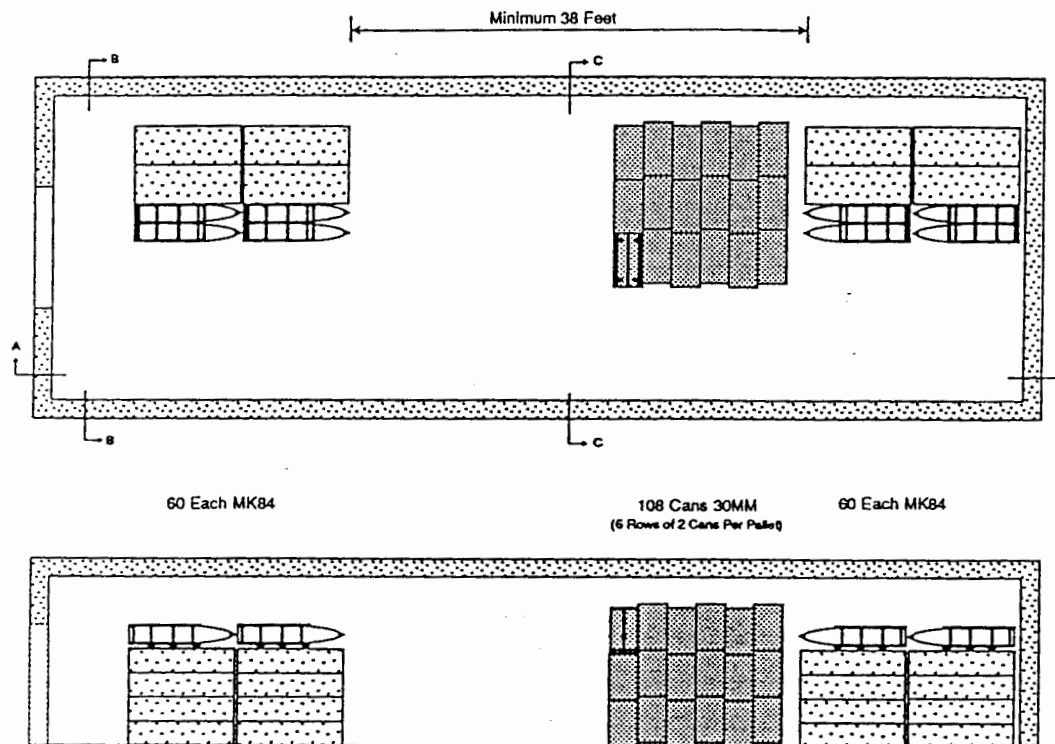
MK 84 (Tritonal Filled)  
With 20MM Buffer  
Steadley Igloo

Reviewed By: *Joseph J. Price* 4-12-90  
Joseph J. Price  
Director Inactive Munitions  
MSDYOI

Approved By: *Paul D. Price*  
Paul D. Price  
HQ AFISC/SEWY

AFISC Dwg No  
AFISC 900402H

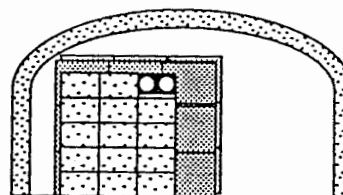
DESB  
*Jack Matthews*



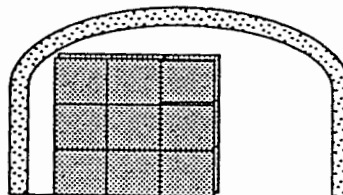
Section A-A

**Notes:**

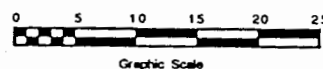
1. Install metal plugs in all MK84 bomb fuze wells.
2. Bombs rows nearest the buffer material must have nose end facing the buffer, bomb stacks must be separated by a minimum of 38 feet.
3. Buffer stack may be positioned anywhere within the space between bomb stacks.
4. Vertical offset of buffer rows must be with metal dunnage. Minimum offset is on the order of 2 to 4 inches or what ever is necessary to prevent line of sight.
5. No line-of-sight permitted from bomb stack to bomb stack through buffer.
6. The total NEW stored, for quantity distance purposes, will be computed upon the combined NEW of the largest stack of bombs and the total NEW of class 1 division 2 buffers. The NEW of class 1 division 4, 30MM, is not additive.
7. Buffer may be any configuration of 30MM in standard pack metal cans.
8. Empty space can be used for inert items or additional buffer material specified in this or other approved drawings. Additional buffer materials shall not result in loading densities greater than 3.8 pounds per cubic foot.
9. Caution must be exercised to assure that the integrity of the buffer stack is not disturbed. Removal of any portion of the buffer stack will defeat the integrity of the buffer. The quantity distance requirements will then be based upon the total NEW stored in the facility.
10. Maximum load density for this arrangement is 3.8 pounds per cubic foot.
11. Storage arrangement and aisle spacing shown are based on use of a commercial 6,000 lb. forklift.
12. Aisle dimensions shown herein may be adjusted to suit local conditions and/or available Materials Handling Equipment (MHE).
13. Minimum distance from the walls will be as specified in appropriate technical orders.
14. Serviceable munitions or munitions with only such defects that do not affect explosives safety may be used in the bomb stacks or buffers.



Section B-B



Section C-C



**MK 84 (Tritonal Filled)**  
With 30MM Buffer  
Stradley Igloo

Redrawn By: 4-12-90

*Joseph J. J. Jr.*  
Joseph J. J. Jr.  
Director Insensitive Munitions  
MSD/YOI

AFISC Dwg No:

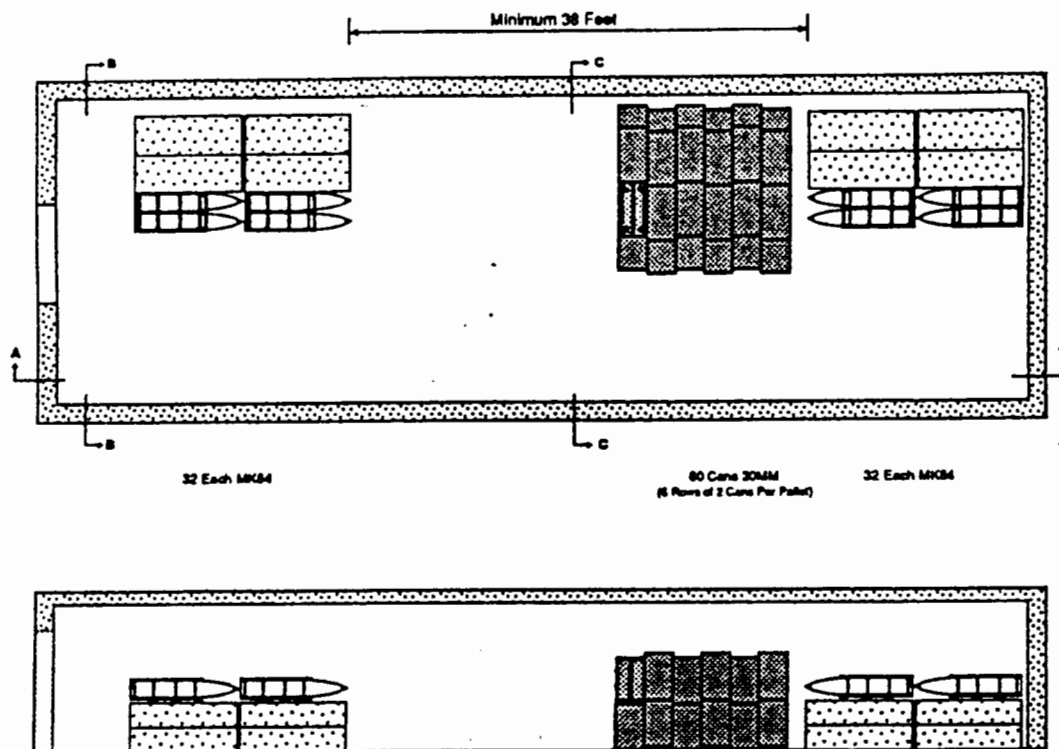
AFISC 900402J

Approved By:

*Paul D. Price*  
Paul D. Price  
HQ AFISC/SEWV

DES8

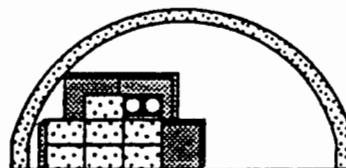




Section A-A

**Notes:**

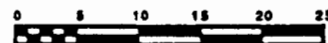
1. Install metal plugs in all MK84 bomb fuze wells.
2. Bombs rows nearest the buffer material must have nose end facing the buffer, bomb stacks must be separated by a minimum of 38 feet.
3. Buffer stack may be positioned anywhere within the space between bomb stacks.
4. Vertical offset of buffer rows must be with metal dunnage. Minimum offset is on the order of 2 to 4 inches or what ever is necessary to prevent line of sight.
5. No line-of-sight permitted from bomb stack to bomb stack through buffer.
6. The total NEW stored, for quantity distance purposes, will be computed upon the combined NEW of the largest stack of bombs and the total NEW of class 1 division 2 buffers. The NEW of class 1 division 4, 30MM, is not additive.
7. Buffer may be any configuration of 30MM in standard pack metal cans.
8. Empty space can be used for inert items or additional buffer material specified in this or other approved drawings. Additional buffer materials shall not result in loading densities greater than 3.8 pounds per cubic foot.
9. A minimum thickness of 1" dunnage must be used between the first and second level containers of 30MM ammunition when offset.
10. Caution must be exercised to assure that the integrity of the buffer stack is not disturbed. Removal of any portion of the buffer stack will defeat the integrity of the buffer. The quantity distance requirements will then be based upon the total NEW stored in the facility.
11. Maximum load density for this arrangement is 3.8 pounds per cubic foot.
12. Storage arrangement and aisle spacing shown are based on use of a commercial 6,000 lb. forklift.
13. Aisle dimensions shown herein may be adjusted to suit local conditions and/or available Materials Handling Equipment (MHE).
14. Minimum distance from the walls will be as specified in appropriate technical orders.
15. Serviceable munitions or munitions with only such defects that do not affect explosives safety may be used in the bomb stacks or buffers.



Section B-B



Section C-C



Graphic Scale

**MK 84 (Tritonal Filled)**  
With 30MM Buffer  
Arch Igloo

Reviewed By: 472-46

*Joseph J. Jones*  
Joseph J. Jones  
Director Inertive Munitions  
MSDYOI

AFISC Dwg No:

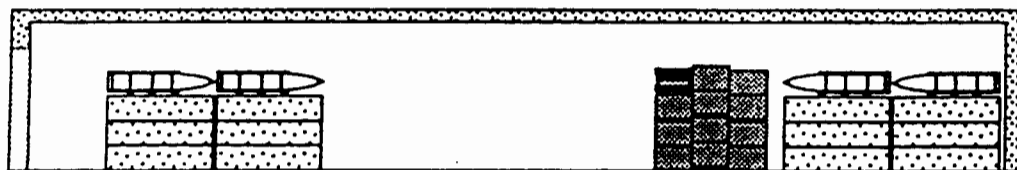
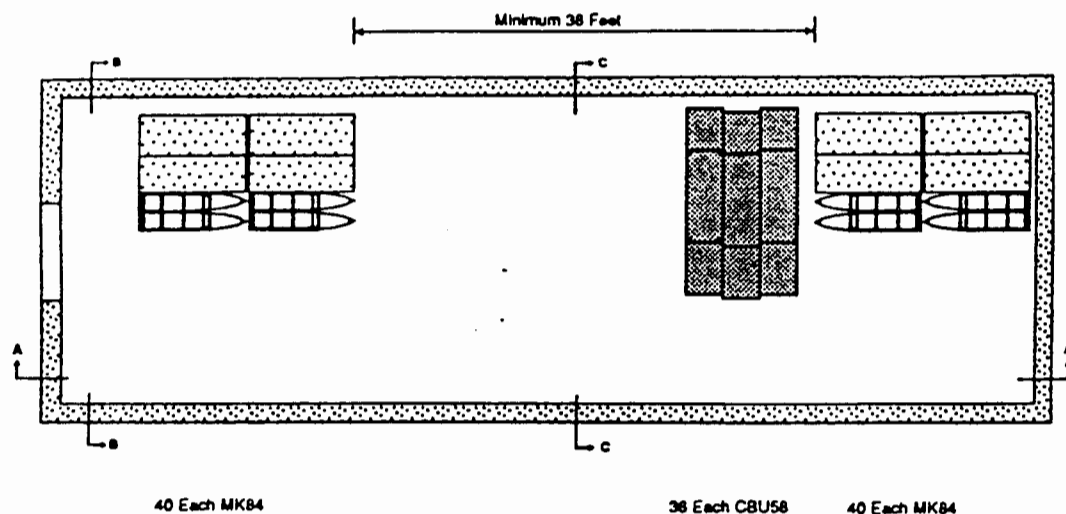
AFISC 9004021

Approved By: 472-46

*Paul D. Price*  
Paul D. Price  
HQ AFISC/SEW

DIESA

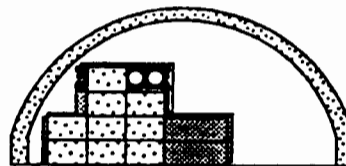
*John Hall*



Section A-A

**Notes:**

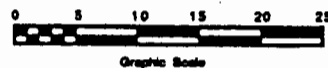
1. Install metal plugs in all MK84 bomb fuze wells.
2. Bombs rows nearest the buffer material must have nose end facing the buffer, bomb stacks must be separated by a minimum of 36 feet.
3. Buffer stack may be positioned anywhere within the space between bomb stacks.
4. Vertical offset of buffer rows must be with metal dunnage. Minimum offset is on the order of 2 to 4 inches or what ever is necessary to prevent line of sight.
5. No line-of-sight permitted from bomb stack to bomb stack through buffer.
6. The total NEW stored, for quantity distance purposes, will be computed upon the combined NEW of the largest stack of bombs and the total NEW of class 1 division 2 buffers.
7. Buffer may be any series metal container loaded with two each CBU58's.
8. Empty space can be used for inert items or additional buffer material specified in this or other approved drawings. Additional buffer materials shall not result in loading densities greater than 6.14 pounds per cubic foot.
9. A minimum thickness of 2" dunnage must be used between the second and third level containers of CBU's when offset.
10. Caution must be exercised to assure that the integrity of the buffer stack is not disturbed. Removal of any portion of the buffer stack will defeat the integrity of the buffer. The quantity distance requirements will then be based upon the total NEW stored in the facility.
11. Maximum load density for this arrangement is 6.14 pounds per cubic foot.
12. Storage arrangement and aisle spacing shown are based on use of a commercial 8,000 lb. forklift.
13. Aisle dimensions shown herein may be adjusted to suit local conditions and/or available Materials Handling Equipment (MHE).
14. Minimum distance from the walls will be as specified in appropriate technical orders.
15. Serviceable munitions or munitions with only such defects that do not affect explosives safety may be used in the bomb stacks or buffers.



Section B-B



Section C-C



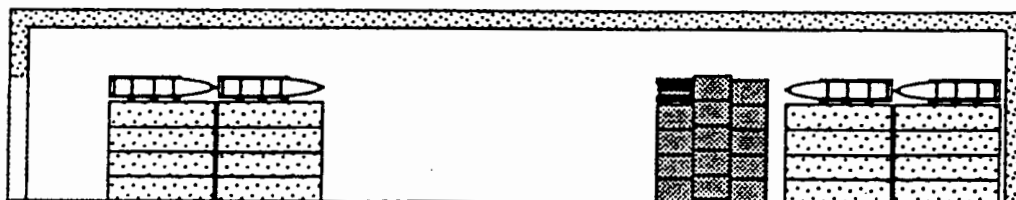
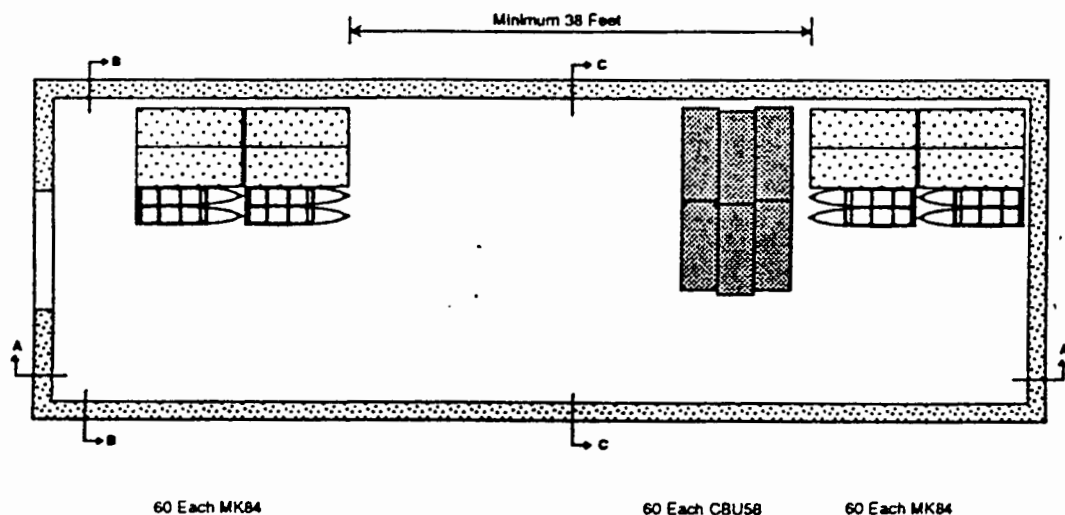
**MK 84 (Tritonal Filled)**  
With CBU58 Buffer  
Arch Igloo

Reviewed By: *Joseph J. Jones*  
Joseph J. Jones, Jr.  
Director Inertive Munitions  
MSD/YOI

Approved By: *Paul A. Price*  
HQ AFISC/SEWH

AFISC Draw No.  
AFISC 900402K

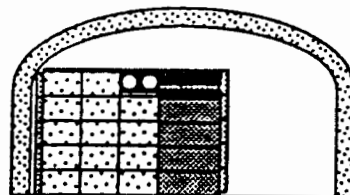
DOES B.  
*John Haller*



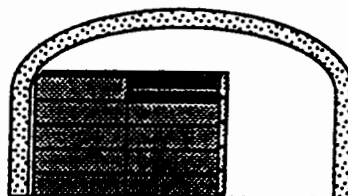
Section A-A

### Notes:

1. Install metal plugs in all MK84 bomb fuze wells.
2. Bomb rows nearest the buffer material must have nose end facing the buffer, bomb stacks must be separated by a minimum of 38 feet.
3. Buffer stack may be positioned anywhere within the space between bomb stacks.
4. Vertical offset of buffer rows must be with metal dunnage. Minimum offset is on the order of 2 to 4 inches or what ever is necessary to prevent line of sight.
5. No line-of-sight permitted from bomb stack to bomb stack through buffer.
6. The total NEW stored, for quantity distance purposes, will be computed upon the combined NEW of the largest stack of bombs and the total NEW of class 1 division 2 buffers.
7. Buffer may be any series metal container loaded with two each CBU58's.
8. Empty space can be used for inert items or additional buffer material specified in this is or other approved drawings. Additional buffer materials shall not result in loading densities greater than 6.14 pounds per cubic foot.
9. Caution must be exercised to assure that the integrity of the buffer stack is not disturbed. Removal of any portion of the buffer stack will defeat the integrity of the buffer. The quantity distance requirements will then be based upon the total NEW stored in the facility.
10. Maximum load density for this arrangement is 6.14 pounds per cubic foot.
11. Storage arrangement and aisle spacing shown are based on use of a commercial 6,000 lb. forklift.
12. Aisle dimensions shown herein may be adjusted to suit local conditions and/or available Materials Handling Equipment (MHE).
13. Minimum distance from the walls will be as specified in appropriate technical orders.
14. Serviceable munitions or munitions with only such defects that do not affect explosives safety may be used in the bomb stacks or buffers.



Section B-B



Section C-C



Graphic Scale

**MK 84 (Tritonal Filled)**  
With CBU58 Buffer  
Bradley Igloo

Reviewed By:

*Joseph J. Arnes, Jr.*  
Joseph J. Arnes, Jr.  
Director Insensitive Munitions  
MSDYCI

AFISC Dwg No

AFISC 900402L

Approved By:

*Paul A. Price*  
Paul A. Price  
MO AFISC/SEWV

DCES